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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,778	01/15/2004	Michael P.C. Watts	P80/MII-40-22-03	6151

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EXAMINER	
WOLLSCHLAGER, JEFFREY MICHAEL	
ART UNIT	PAPER NUMBER
1732	

DATE MAILED: 10/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/757,778	WATTS ET AL.	
	Examiner	Art Unit	
	Jeff Wollschlager	1732	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 25-28* is/are pending in the application.

4a) Of the above claim(s) *25 and 28* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17,26 and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/31/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's amendment to the claims, filed July 31, 2006 has been entered. Claims 1 and 11 are currently amending. Claims 25-28 are new. Newly submitted claims 25 and 28 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the claims read on non-elected Species B.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 25 and 28 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claims 1-17, 26 and 27 are currently under examination.

Drawings

The replacement drawings for Figures 7-10 were received on July 31, 2006. These drawings are accepted.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-17, 26, and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitations "substantially transparent to said thermal radiation" and "responsive to ultraviolet radiation" are unclear as to their limiting effect.

The term "substantially transparent" in claims 1 and 11 is a relative term which renders the claim indefinite. The term "substantially transparent" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Applicant does state the imprinting layer/material is substantially transparent to infrared radiation (e.g. thermal radiation) in the specification (Abstract). However, applicant further states that "It is possible to employ the requisite composition of material 36a [the imprinting material] to allow cross-linking employing IR alone or in conjunction with UV radiation. As a result, material 36a would have to be heated with sufficient energy to facilitate IR cross-linking" (US Patent Application Publication 2005/0156353; paragraph [0031]).

Further, it is unclear what is intended by "being responsive to ultraviolet radiation" As evidenced by claims 26 and 27, the limitation is broader than polymerization. As such, any material that responds to UV radiation in any way is understood to meet the claim limitations.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-17, 26 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Chou et al. (U.S. Patent Application Publication 2004/0036201; published February 26, 2004, with a provisional filing date of May 24, 2002).

Regarding claim 1, Chou et al., as best depicted in Figure 7, teach an imprint lithography method comprising the steps of collecting thermal radiation, in the form of infrared radiation, at a target, defining the collected thermal energy in terms of the ability of the collected energy to heat, soften, or cure the material to be imprinted, and transferring the collected thermal energy by conduction to the material to be imprinted (paragraph [0038]). The imprinting material is substantially transparent to thermal/infrared radiation and is responsive to UV radiation (paragraphs [0024, 0028, 0031, 0032, 0033, 0038]).

By heating the imprint material, the method of Chou et al. improves the ability of the material to flow. There are two possible targets in the method taught by Chou et al. The first target is the combination of the mold (10) and the conductive layer (14) in

Figure 7. The second target is the combination of the substrate (20) and the conductive layer (23) in Figure 7.

As to claim 2, the viscosity of the imprinting material is reduced when it is heated. (paragraph [0038])

As to claim 3, the imprint materials taught by Chou et al. can be thermoplastic resins, heat curable materials, or radiation curable materials (paragraph [0024]). These materials have glass transition temperatures. Further, Chou et al. exemplify the use of PMMA being heated to 120 °C. (paragraph [0024]). The glass transition temperature of PMMA is 105 °C . Also, the materials to be imprinted are heated and softened by the infrared radiation (paragraph [0038]). It is inherent that softening a thermoplastic to any useful degree requires it to be heated above its glass transition temperature.

As to claim 4, the thermo-curable or photo-curable imprinting materials are cured in the method of Chou et al. (paragraphs [0024] and [0038]). This is cross-linking the imprinting material.

Regarding claim 5, Chou et al. teach that one of the conductive layers (14) or (23) may be omitted (paragraph [0033]). By omitting conductive layer (14), for example, in view of Figure 7, the thermal radiation is propagated through the imprinting material. Additionally, Chou et al. teach that it may be advantageous to make the mold (10) or the substrate (20), including the conductive layers, partially transparent to radiation (paragraph [0032]). If these materials were partially transparent to the thermal radiation, the thermal radiation would also propagate through the imprinting material.

As to claim 6, the imprinting material is positioned upon a substrate (Figure 7) and when the substrate is partially transparent as taught by Chou et al. (paragraph [0032]), the radiation propagates through the substrate.

As to claims 7 and 9, both the mold (10) and conductive layer (14) combination and the substrate (20) and conductive layer (23) combination are bodies that have first and second opposed sides that collect thermal radiation on a first side and transfer thermal radiation to a second side.

As to claim 10, Chou et al. teach positioning a mold having a plurality of protrusions and recesses proximate to the imprinting material with the imprinting material substantially filling the recesses, and impinging actinic energy, in the form of ultraviolet radiation, upon the imprinting material to polymerize it (Figure 1, Figure 7, paragraphs [0024] and [0038]).

Regarding claim 11, Chou et al., as best depicted in Figure 7, teach an imprint lithography method comprising the steps of collecting thermal radiation, in the form of infrared radiation, at a target, defining the collected thermal energy in terms of the collected energy's ability to heat, soften, or cure the material to be imprinted, and transferring the collected thermal energy by conduction to the material to be imprinted (paragraph [0038]). The imprinting material is substantially transparent to thermal/infrared radiation and is responsive to UV radiation (paragraphs [0024, 0028, 0031, 0032, 0033, 0038]).

By heating the imprint material, the method of Chou et al. improves the flow ability of the material. There are two possible targets in the method of Chou et al. The

first target is the combination of the mold (10) and the conductive layer (14) in Figure 7. The second target is the combination of the substrate (20) and the conductive layer (23) in Figure 7. The imprinting material is clearly in superimposition of the substrate (20) and conductive layer (23) combination target.

As to claim 12, Chou et al. teach positioning a mold having a plurality of protrusions and recesses proximate to the imprinting material with the imprinting material substantially filling the recesses, and impinging actinic energy, in the form of ultraviolet radiation, upon the imprinting material to polymerize it (Figure 1, Figure 7, paragraphs [0024] and [0038]).

As to claim 13, heating reduces the viscosity of the material.

As to claim 14, the imprint materials taught by Chou et al. can be thermoplastic resins, heat curable materials, or radiation curable materials (paragraph [0024]). These materials have glass transition temperatures. Further, Chou et al. exemplify the use of PMMA being heated to 120 °C. (paragraph [0024]). The glass transition temperature of PMMA is 105 °C . Also, the materials to be imprinted are heated and softened by the infrared radiation (paragraph [0038]). It is inherent that softening a thermoplastic to any useful degree requires it to be heated above its glass transition temperature.

As to claim 15, the thermo or photo curable imprinting materials are cured in the method of Chou et al. (paragraphs [0024] and [0038]). This is cross-linking the imprinting material.

As to claim 16, the imprinting material is positioned upon a surface of the substrate (20) and conductive layer (23) combination. This combination is a target.

As to claim 17, Chou et al. teach that one of the conductive layers (14) or (23) may be omitted (paragraph [0033]). By omitting conductive layer (14), for example, in view of Figure 7, the thermal radiation is propagated through the imprinting material. Additionally, Chou et al. teach that it may be advantageous to make the mold (10) or the substrate (20), including the conductive layers partially transparent to radiation (paragraph [0032]). If these materials were partially transparent to the thermal radiation, the thermal radiation would also propagate through the imprinting material.

As to claims 26 and 27, the imprinting material employed by Chou responds to UV radiation by polymerizing (paragraph [0024]).

Claims 1-9, 11, 13-17, 26 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Shih et al. (U.S. Patent Application Publication 2003/0071016; published April 17, 2003, with a provisional filing date of October 11, 2001).

Regarding claim 1, Shih et al. teach an imprint lithography method comprising collecting thermal radiation, in the form of infrared radiation at a target, defining the collected thermal energy in terms of the ability of the collected energy to heat or cure the material to be imprinted, and transferring the collected thermal energy by conduction to the material to be imprinted. (Example 3 and Example 11). The imprinting material is "substantially transparent" to thermal/infrared radiation and is "responsive" to UV radiation (paragraphs [0022, 0023, 0030, 0031]).

As to claim 2, heating the imprint material reduces its viscosity (Example 3).

As to claim 3, Shih et al. teach using polymers as the imprint material. Polymers have glass transition temperatures. These polymers are heated to their flow temperature. (Example 3 and Example 11). Inherently, heating a polymer to its flow temperature requires the temperature to be above its glass transition temperature.

As to claim 4, Shih et al. teach curing photo-curable or thermo-curable imprinting materials (paragraphs [0023] and [0030]). Curing is cross-linking the material.

As to claim 5, Shih et al. teach propagating the thermal radiation through the imprinting material (Example 3).

As to claim 6, Shih et al. position the imprinting material upon a substrate and propagate thermal radiation through the substrate (Example 11). It is noted that the silicon wafer substrate used by Shih et al. will have some transparency to infrared radiation.

As to claims 7 and 9, the substrate, a body, used in the method of Shih et al. has first and second opposed sides, and collects thermal radiation proximate to the first side and transfers the thermal radiation to the second side (Example 11). Additionally, the mold used in the method taught by Shih et al. is not fully transparent to infrared radiation through the full spectrum. In turn, the FEP mold used in Example 3 would also collect some thermal radiation on one side and transfer thermal radiation to the second side.

Claim 11 is directed to a method to improve the flow rate of an imprinting material comprising impinging thermal radiation upon a target to collect thermal energy, defining the collected thermal energy with the imprinting material in superimposition with

the target and conducting the collected thermal energy to the imprinting material to increase a temperature thereof.

Shih et al. teach an imprint lithography method comprising collecting thermal radiation, in the form of infrared radiation at a target, defining the collected thermal energy in terms of the ability of the collected energy to heat or cure the material to be imprinted, and transferring the collected thermal energy by conduction to the material to be imprinted. (Example 3 and Example 11). The imprinting material is in superimposition of the wafer substrate. The imprinting material is "substantially transparent" to thermal/infrared radiation and is "responsive" to UV radiation.

As to claim 13, heating the imprinting material reduces its viscosity.

As to claim 14, Shih et al. teach using polymers as the imprint material. Polymers have glass transition temperatures. These polymers are heated to their flow temperature. (Example 3 and Example 11). Inherently, heating a polymer to its flow temperature requires the temperature to be above its glass transition temperature.

As to claim 15, Shih et al. teach curing photo-curable or thermo-curable imprinting materials (paragraphs [0023] and [0030]). Curing is cross-linking the material.

As to claim 16, Shih et al. teach positioning the imprinting material upon a surface of the wafer substrate target (Example 3 and Example 11)

As to claim 17, Shih et al. teach propagating the impinging thermal radiation, in the form of infrared radiation, through the imprinting material (Example 3).

As to claims 26 and 27, the imprinting material employed by Shih et al. responds to UV radiation by polymerizing (paragraphs [0022, 0023, 0030, 0031]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et al. (U.S. Patent Application Publication 2003/0071016; published April 17, 2003, with a provisional filing date of October 11, 2001).

As to claim 10, Shih et al. teach the method of claim 1 as discussed in the 102(e) rejection above and further teach positioning a mold having a plurality of protrusions and recesses proximate to the imprinting material with the imprinting material substantially filling the recesses, and further teach impinging actinic energy, in the form of ultraviolet radiation, upon the imprinting material to polymerize it. (paragraphs [0022, 0023], [0030, 0031], and Figure 2). Shih et al. do not explicitly teach using both thermal radiation and actinic energy as part of the same process. However, Shih et al. teach that both infrared and ultraviolet radiation are conventional means for curing flowable compositions (paragraph [0023]) and that using these means is dependent upon the materials being utilized (paragraph [0031]). Therefore it would have been *prima facie*

obvious, based on the teaching of Shih et al., to one of ordinary skill in the art at the time of the claimed invention to use both conventional means, depending on the material to be imprinted and the materials being used for imprinting, because one of ordinary skill would understand that infrared radiation and ultraviolet radiation serve similar purposes, but that they are not completely interchangeable in all applications.

As to claim 12, Shih et al. teach the method of claim 11 as discussed in the 102(e) rejection above and further teach positioning a mold having a plurality of protrusions and recesses proximate to the imprinting material with the imprinting material substantially filling the recesses, and further teach impinging actinic energy, in the form of ultraviolet radiation, upon the imprinting material to polymerize it. (paragraphs [0023], [0031], and Figure 2). Shih et al. do not explicitly teach using both thermal radiation and actinic energy as part of the same process. However, Shih et al. teach that both infrared and ultraviolet radiation are conventional means for curing flowable compositions (paragraph [0023]) and that using these means is dependent upon the materials being utilized (paragraph [0031]). Therefore it would have been *prima facie* obvious, based on the teaching of Shih et al., to one of ordinary skill in the art at the time of the claimed invention to use both conventional means, depending on the material to be imprinted and the materials being used for imprinting, because one of ordinary skill would understand that infrared radiation and ultraviolet radiation serve similar purposes, but that they are not completely interchangeable in all applications.

Response to Arguments

Applicant's arguments filed July 31, 2006 have been fully considered but they are not persuasive.

Applicant's arguments appear to be on the following grounds:

1. Chou teaches away from Applicant's claimed invention by teaching the layers are transparent to radiation.

2. The polymer(s) employed by Shih et al. is responsive to thermal radiation and does not mention being responsive to UV radiation.

3. Both Chou and Shih et al. are silent as to "collecting", "defining" and "transferring".

Applicant's arguments are not persuasive for the following reasons.

1. Applicant's reference to Chou (paragraph [0032]) is not a complete statement. The quotation is "In some applications..... materials at least partially transparent to radiation...can be used" (emphasis added).

2. The examiner notes that the terms "substantially transparent" and "responsive" are deemed indefinite. The examiner further notes that applicant's imprinting material is responsive to thermal/infrared radiation. Further, Shih et al. do disclose material responsive to UV radiation (paragraphs [0022, 0023, 0030, 0031]).

3. While Chou and Shih et al. may not use the exact words, as further explained in the rejections above, the radiation is "collected", "defined" (e.g.

temperature increase, polymerization results), and "transferred" to the imprinting material.

Conclusion

All claims are rejected.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Wollschlager whose telephone number is 571-272-8937. The examiner can normally be reached on Monday - Thursday 7:00 - 4:45, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JW

Jeff Wollschlager
Examiner
Art Unit 1732

October 5, 2006

CHRISTINA JOHNSON
PRIMARY EXAMINER
10/12/06